

G079
Polyhalogenated Dibenzodioxins/Furans

Results of Testing

Chemical Name	CAS No.	Company Name	Study Code/Type	Protocol/Guidline	Results	Reference
1,2-Bis(tribromophenoxy)-ethane	37853-59-1	Great Lakes Chemical Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Six of the seven samples analyzed showed no contamination at the detection limit. One sample of the seven contained three furan contaminants at levels below the Target Limits of Quantitation (LOQs) specified by the Test Rule.	58 FR 21302; 2/19/93 Docket# OPPTS-44596
2,4-Dichlorophenol	120-83-2	Dow Chemical Company	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	None of the seven test samples analyzed contained Dioxins/ Furans above or below the levels of the Target LOQs specified by the Test Rule.	Docket# OPPTS-83002C, H1-19 file, 12/5/91
2,4,6-Tribromophenol	118-79-6	Great Lakes Chemical Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	None of the seven test samples analyzed contained Dioxins/Furans at levels above or below the Target LOQs specified by the Test Rule.	57 FR 27972; 6/23/92; Docket# OPPTS-44586
Chloranil (high dioxin/high dibenzofuran)	118-75-2	A & D International	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/Furans were detected at levels above the Target LOQs specified by the Test Rule.	55 FR 21934; 5/30/90 OTS0540720
Chloranil (high dioxin/high dibenzofuran)	118-75-2	Chugai Boyeki Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/Furans were detected at levels above the Target LOQs specified by the Test Rule.	55 FR 21934; 5/30/90 OTS0540721
Chloranil (low dioxin/low dibenzofuran)	118-75-2	Chugai Boyeki Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/ Furans were detected at levels below the Target LOQs specified by the Test Rule.	61 FR 21179; 5/9/96, Docket# OPPTS-44625
Chloranil (high dioxin/high dibenzofuran)	118-75-2	Hoechst Celanese Corporation	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/Furans were detected at levels above the Target LOQs specified by the Test Rule.	54 FR 52449; 12/21/89 Docket# OPPTS-44544
Chloranil (low dioxin/low dibenzofuran)	118-75-2	Rhone-Poulenc	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/ Furans were detected at levels below the Target LOQs specified by the Test Rule.	received 7/26/95, Docket# OPPTS-83002C-H1.7 (13)
Chloranil (high dioxin/high dibenzofuran)	118-75-2	Sandoz Chemicals	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/Furans were detected at levels above the Target LOQs specified by the Test Rule.	55 FR 3482; 2/1/90; Docket# OPPTS-44593
Decabromodiphenyloxide	1163-19-5	Ameribrom, Inc.	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Second analysis, original submission was not accepted by EPA. Dioxins/Furans were detected at levels below the Target LOQs specified by the Test Rule.	59 FR 27547; 5/27/94; Docket# OPPTS-44609
Decabromodiphenyloxide	1163-19-5	Ethyl Corporation (Albermarle)	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/ Furans were detected at levels below the Target LOQs specified by the Test Rule.	57 FR 27972; 6/23/92; Docket# OPPTS-44586
Decabromodiphenyloxide	1163-19-5	Great Lakes Chemical Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/Furans were detected at levels below the Target LOQs specified by the Test Rule.	57 FR 27972; 6/23/92; Docket# OPPTS-44586

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Chemical Name	CAS No.	Company Name	Study Code/Type	Protocol/Guidline	Results	Reference
Octabromodiphenyloxyde	32536-52-0	Ameribrom, Inc.	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/ Furans were detected at levels below the Target LOQs specified by the Test Rule.	58 FR 21302; 2/19/93 Docket# OPPTS-44596
Octabromodiphenyloxyde	32536-52-0	Ethyl Corporation (Albermarle)	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/ Furans were detected at levels above the Target LOQs specified by the Test Rule.	57 FR 27972; 6/23/92; Docket# OPPTS-44586
Octabromodiphenyloxyde	32536-52-0	Great Lakes Chemical Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/ Furans were detected at levels below the Target LOQs specified by the Test Rule.	57 FR 27972; 6/23/92; Docket# OPPTS-44586
Pentabromodiphenyl oxide	32534-81-9	Ameribrom, Inc.	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	All seven test samples analyzed contained Dioxins/ Furans at levels above the Target LOQs specified by the Test Rule.	58 FR 21302; 4/20/93; Docket# OPPTS-44597
Pentabromodiphenyl oxide	32534-81-9	Great Lakes Chemical Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	All seven test samples analyzed contained Dioxins/Furans at levels above the Target LOQs specified by the Test Rule.	58 FR 21302; 4/20/93; Docket# OPPTS-44597
Pentabromodiphenyloxyde	32534-81-9	Akzo Noble Chemicals Inc.	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Dioxins/ Furans were detected at levels above the Target LOQs specified by the Test Rule.	Docket# OPPTS-83002, F1-1 file, 2/9/95
Tetrabromobisphenol A	79-94-7	Ameribrom, Inc.	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	Second analysis, original submission was not accepted by EPA. Dioxins/ Furans were detected below the Target LOQs specified by the Test Rule.	59 FR 27547; 5/27/94; Docket# OPPTS-44609
Tetrabromobisphenol A	79-94-7	Ethyl Corporation (Albermarle)	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	None of the seven test samples analyzed contained Dioxins/ Furans above the levels of the Target LOQs specified by the Test Rule. However, one sample did contain Dioxins/ Furans at a level 1/6000 of the Test Rule Target LOQ.	57 FR 3898; 11/13/92; Docket# OPPTS-44592
Tetrabromobisphenol A	79-94-7	Great Lakes Chemical Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	None of the seven test samples analyzed contained Dioxins/Furans above or below the levels of the Target LOQs specified by the Test Rule.	57 FR 7972; ; 6/23/92; OPPTS-44586
Tetrabromobisphenol A, allyl ether	25327-89-3	Great Lakes Chemical Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	None of the seven test samples analyzed contained Dioxins/Furans at levels above or below the Target LOQs specified by the Test Rule.	57 FR 3898; 11/13/92 OTS0536866
Tetrabromobisphenol A, bisethoxylate	4162-45-2	Great Lakes Chemical Corp	EFANAL Analytical Testing of a manufactured product for Dioxins/ Furans	Industry developed/ EPA Panel approved protocol	None of the seven test samples analyzed contained Dioxins/ Furans above or below the levels of the Target LOQs specified by the Test Rule.	57 FR 27972; 6/23/92; Docket# OPPTS-44586

APPENDIX A

12 Chemicals in Commerce Requiring Contaminant Testing

Chemical	CAS No.
1,2-Bis(tribromophenoxy)ethane	37853-59-1
Decabromodiphenyloxide	1163-19-5
2,4-Dichlorophenol	120-83-2
Octabromodiphenyloxide	32536-52-0
Pentabromodiphenyloxide	32534-81-9
Tetrabromobisphenol A	79-94-7
Tetrabromobisphenol A diacrylate	55205-38-4
Tetrabromobisphenol A, allyl ether	25327-89-3
Tetrabromobisphenol A, bisethoxylate	4162-45-2
Tetrabromobisphenol A, bis-2,3-dibromo-	21850-44-2
Tetrachloro-1,4-benzoquinone (Chloranil)	118-75-2
2,4,6-Tribromophenol	118-79-6

APPENDIX B

**20 Chemicals Requiring Contaminant Testing if Commercial Production
Begins or Resumes**

Chemical	CAS No.
Alkylamine tetrachlorophenate	<i>Not available</i>
2,4-Dibromophenol	615-58-7
3,5-Dibromosalicylanilide	2577-72-2
2,6-Dibromo-4-nitrophenol	99-28-5
2,3-Dichlorophenol	576-24-9
2,5-Dichlorophenol	583-78-8
2,6-Dichlorophenol	87-65-0
3,4-Dichlorophenol	95-77-2
2,5-Dichlorophenol, 4-bromo-	1940-42-7
3,5-Dichlorosalicylic acid	320-72-9
Pentabromophenol	608-71-9
Pentachlorophenyl laurate	3772-94-9
Propionic acid, 2[2,4(dichlorophenoxy)]-	120-36-5
Tetrabromobisphenol A, bismethyl ether	37853-61-5
Tetrabromocatechol	488-47-1
Tetrachlorobisphenol A	79-95-8
Tetrabromobisphenol B	<i>Not available</i>
3,4,5-Tribromosalicylanilide	87-10-5
2,3,6-Trichlorophenol	933-75-5
2,4,5-Trichlorophenol	95-95-4

APPENDIX C

28 Precursor Chemicals^b

Chemical	CAS No.
Bromobenzene	108-86-1
2-Bromophenol	95-56-7
Butyric acid, 4-(2-methyl-4-chlorophenoxy)	94-81-5
Chlorobenzene	108-90-7
<i>o</i> -Chlorofluorobenzene	348-51-6
Chlorohydroquinone	615-67-8
2-Chlorophenol	95-57-8
4-Chlororesorcinol	95-88-5
5-Chloro-2,4-dimethoxyaniline	97-50-7
4-Chloro-2-nitrophenol	89-64-5
3-Chloro-4-fluoronitrobenzene	350-30-1
2-Chloro-4-phenylphenol	92-04-6
4-Chloro- <i>o</i> -toloxy acetic acid	94-74-6
2,6-Dibromo-4-nitroaniline	827-94-1
1,2-Dichlorobenzene	95-50-1
1,4-Dichlorobenzene	106-46-7
1,4-Dichloro-2-nitrobenzene	89-61-2
2,6-Dichloro-4-nitroaniline	99-30-9
1,2-Dichloro-4-nitrobenzene	99-54-7
Pentabromoethylbenzene	85-22-3
1,2,3,4,5-Pentabromo-5-chlorocyclohexane	87-84-3
1,2,4,5-Tetrachlorobenzene	95-94-3
1,2,4,5-Tetrachloro-3-nitrobenzene	117-18-0
1,3,5-Tribromobenzene	626-39-1
1,2,3-Trichlorobenzene	87-61-6
1,2,4-Trichlorobenzene	120-82-1
1,3,5-Trichlorobenzene	108-70-3
2,4,5-Trichloronitrobenzene	89-69-0

^bDibromobenzene (CAS No. 106-37-6) was identified in the preamble to 52 FR 21412 as one of 29 precursor chemicals, however, it was inadvertently omitted from the regulatory text. Since the regulatory text identified only 28 chemicals, 28 chemicals appear in 40 CFR 766.38.

APPENDIX D

VOLUNTARY PRODUCT STEWARDSHIP PROGRAMS

Chloranil

Introduction:

- o The EPA approach used in the chloranil project promoted innovation within the chloranil industry and resulted in significant EPA resource savings when compared to traditional regulatory approaches.
- o Chloranil is an industrial intermediate used in tire manufacturing and in the production of dyes and pigments.

The Problem:

- o **Industry test samples of chloranil indicated potential for extremely high dioxin concentrations in parts per million (ppm).**
 - The TSCA §4 D/F Test Rule requires that all chloranil importers to test for D/F contamination.
 - Most chloranil importers were found to be in violation of the Test Rule.
 - Despite data quality problems EPA was able to conclude that the test samples contained extremely high dioxin concentrations in ppm.
- o **Further EPA testing indicated that contamination could carry over to products made from chloranil.**
 - EPA and Canadian labs tested Violet 23, a pigment made using chloranil, and found significant carryover of contamination.
- o **Risk assessments for workers using chloranil indicated significant cancer risks.**
 - Risk assessments performed for workers using chloranil indicated significant cancer risks (greater than 1 in 100 for several exposure scenarios).

VOLUNTARY PRODUCT STEWARDSHIP PROGRAMS (cont.)

- The cancer risks to users of products made from chloranil were less clear because of a lack of reliable exposure data.
- Cancer risks associated with production of chloranil were not assessed because no chloranil is produced in the United States.

RM2 Solutions:

- o During enforcement negotiations related to Test Rule violations, EPA learned that manufacturers could reduce the dioxin contamination levels in chloranil by more than 2 orders of magnitude, from more than 3100 ppb TCDD TEQ^c to less than 20 ppb TCDD TEQ, by changing feedstocks/manufacturing processes. The resulting product is referred to as low dioxin chloranil (LDC).
- o Upon learning about LDC, EPA developed a multi-pronged strategy for achieving a complete chemical industry-wide switch from high dioxin contaminated chloranil to LDC.
- o The principal objectives of the strategy were to: 1) eliminate supplies of highly contaminated “old” chloranil; 2) eliminate demand for “old” chloranil; and 3) inhibit reintroduction of “old” chloranil.

1) Eliminate Supplies of “Old” Chloranil

Five chloranil importers (A&D, Sandoz, Chugai, Hoechst, and ICI) were in violation of the D/F test rule. Test rule enforcement negotiations were utilized to encourage these companies to switch to LDC as part of their consent agreements. All five companies either agreed to switch to LDC or to discontinue import.

One chloranil importer, Rhone Poulenc, did not violate the test rule. These companies signed a voluntary agreement to sell only LDC.

^cThe term “TCDD TEQ” means the total toxicity of individual polychlorinated dibenzo-*p*-dioxins (CDDs) and polychlorinated dibenzofurans (CDFs) or mixtures of CDDs and CDFs expressed as an equivalent of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin or 2,3,7,8-TCDD. To find the TCDD TEQ for a particular sample, the concentration of each CDD congener is determined and multiplied by its toxicity equivalency factor (TEF). The products are then added to determine the TEQ. (Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-*p*-Dioxins and Dibenzofurans (CDDs/CDFs) and 1989 Update. Risk Assessment Forum, EPA/625/3-89/016, March 1989.)

VOLUNTARY PRODUCT STEWARDSHIP PROGRAMS (cont.)**2) Eliminate Demand for “Old” Chloranil**

EPA held stakeholders dialogues with chloranil-derived products industries to promote conversion to LDC.

All known chloranil users and importers of products made from chloranil signed voluntary agreements to import, purchase and use only LDC and/or products made from LDC.

3) Inhibit Reintroduction of “Old” Chloranil

EPA proposed a TSCA §5 “Significant New Use Rule” (SNUR) on May 12, 1993. The SNUR requires that any company which imports, manufactures, or processes chloranil containing more than 20 ppb TCDD TEQ must notify the Agency. Upon receipt of the “Significant New Use Notice” (SNUN), EPA will have an opportunity to issue a TSCA order prohibiting or limiting manufacture or import of chloranil contaminated with D/F.

EPA based the TCDD TEQ limit in the proposed SNUR on the best available data from new production processes and on commitments from importers. The best available data at this time indicate that a limit of less than or equal to 20 ppb TCDD TEQ can be met by all chloranil importers.

EPA expects to withhold promulgation of the final SNUR until such time that all current importers have completed testing that satisfies the requirements of the TSCA §4 D/F Test Rule, provided that data from such testing become available in a reasonable time period.

If, at the time of promulgation, best available data from any of the importers indicate deviation from 20 ppb TCDD TEQ, EPA expects to increase or lower the limit in the final SNUR, provided that it finds the new limit to be reasonable.

International Cooperation:

EPA is the sponsor of an OECD clearinghouse established to alert OECD countries to the chloranil problem; OPPT reports its progress regularly to the biannual meeting of the OECD Chemicals Group.

In addition, OPPT has participated in several bilateral meetings with Canadian government representatives to discuss the risk assessments and risk management options for chloranil.

VOLUNTARY PRODUCT STEWARDSHIP PROGRAMS (cont.)**Dioxins/Furans in Wood Pulp/Paper Mill Sludge**

- o Polychlorinated dioxins and furans (D/F) are produced when wood pulp is bleached with chlorine or chlorine-derivative compounds.
- o The sludge that results from the wastewater treatment process in pulp and paper mills has been found to be contaminated with D/F.
- o EPA has identified concerns for possible adverse human health and environmental risks posed by the disposal of this sludge through land application and has determined that additional testing and monitoring data to evaluate such risks are needed.
- o Under the terms of a voluntary agreement with EPA, four pulp and paper mills are currently evaluating their sludge for D/F concentrations and are engaged in numerous other types of product stewardship activities (e.g., labeling, modifying land application practices).
- o Under the terms of another voluntary agreement with EPA, the American Forest and Paper Association is collecting, aggregating and submitting the data from the mills to EPA and coordinating the industry's outreach efforts about this voluntary testing and product stewardship program.